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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/796,645	03/09/2004	Robert Malek	26114.13	2185
27683	7590	10/18/2005		
HAYNES AND BOONE, LLP 901 MAIN STREET, SUITE 3100 DALLAS, TX 75202				
EXAMINER QUASH, ANTHONY G				
ART UNIT 2881				
PAPER NUMBER				

DATE MAILED: 10/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/796,645

Applicant(s)

MALEK ET AL.

Examiner

Anthony Quash

Art Unit

2881

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-31 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 July 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date See Detail action.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

The prior submitted in the information disclosure statements dated, 3/9/04, 4/12/04, and 9/28/04 have been considered.

Drawings

The drawings are objected to because numeral 410 referred to in paragraph [0071] is not labeled in the drawing. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must

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be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the examiner does not accept the changes, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

The specification is object to due to a misspelling. The word "radio" in paragraph [0073] should be deleted and replaced with the word "ratio". It is believed by the examiner that this was applicants' original intent. Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over O'Conner [6,720,555] in view of Weller [5,389,784]. As per claim 1, O'Conner [6,720,555] teaches a measurement cell and magnet arrangement for an ion cyclotron resonance mass spectrometer comprising, a magnet assembly including electromagnet having a magnet bore with a longitudinal axis, the electromagnet being arranged to generate a magnetic field with field lines that extend in a direction generally parallel with the longitudinal axis, and an FT-ICR measurement cell arranged within the bore of the electromagnet, the cell having walls within which is defined a cell volume for receiving ions from an external ion source, the cell extending in the direction of the longitudinal axis of the electromagnet and being generally coaxial therewith. See O'Conner [6,720,555] abstract, figs. 1-7, col. 1 lines 30-55, col. 2 lines 10-16, 25-35, 40- column 3, col. 4 lines 1-10, 22-32, 50-57, col. 5 lines 1-50, col. 6 lines 10-67, columns 7-8, col. 9 lines 5-20, col. 10 lines 1-15. However, O'Conner [6,720,555] does not explicitly state the ratio of the sectional area of the magnet bore to the sectional area of the cell volume, each defined in a plane perpendicular to the longitudinal axis being less than 4.25. Weller [5,389,784] teaches that it was known to have the magnetic bore (vacuum chamber) diameter be about 10.2-12.7 cm and the cell diameter to be about 7.6 cm. See Weller [5,389,784] col. 2 lines 35-40, and col. 6 lines 9-20. Therefore the radius = diameter/2 of the magnetic bore would equal 5.1-6.35 cm, and the cell radius would equal 3.8 cm. The area of each would equal $\pi * (\text{radius})^2$. Therefore the ratio, $R = ((\text{radius of magnetic bore})/(\text{radius of cell}))^2$. Based upon Weller [5,389,784], $R =$

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$((5.1\text{cm})/(3.8\text{ cm}))^2 = 1.80$. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to have the ratio of the sectional area of the magnet bore to the sectional area of the cell volume, each defined in a plane perpendicular to the longitudinal axis being less than 4.25, since it was known in the art to have the radii of the magnetic bore and cell to be sufficiently small.

As per claim 2, O'Conner [6,720,555] teaches the magnetic bore and the measurement cell being generally right cylindrical, and wherein the diameter of the magnetic bore is less than 150 mm. See O'Conner [6,720,555] figs. 1-7, col. 2 line 60 – col. 3 line 5. Also see Weller [5,389,784] col. 2 lines 35-40, and col. 6 lines 9-20.

As per claim 3, Weller [5,389,784] teaches the diameter of the magnetic bore being greater than 100 mm, and wherein R is less than 2.85. See Weller [5,389,784] col. 2 lines 35-40, and col. 6 lines 9-20.

As per claim 4, Weller [5,389,784] teaches the diameter of the inside of the cell wall that defines the cell volume being at least 48.6 mm. See Weller [5,389,784] col. 2 lines 35-40, and col. 6 lines 9-20. However, neither O'Conner [6,720,555] nor Weller [5,389,784] explicitly state the diameter of the magnetic bore being less than 100 mm. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the diameter of the magnetic bore be less than 100 mm, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art.

As per claim 5, O'Conner [6,720,555] teaches the magnetic assembly further including a housing arranged to receive the electromagnet, the housing defining a

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housing bore which is smaller than the magnet bore, the housing bore being adapted to receive the measurement cell. See O'Conner [6,720,555] figs. 1-7.

As per claim 6, O'Conner [6,720,555] teaches the magnet assembly electromagnet being a superconducting magnet, the housing acting as a cryostat in use to maintain windings of the electromagnet at a temperature below which they superconduct. See O'Conner [6,720,555] abstract, figs. 1-7, col. 1 lines 30-55, col. 2 lines 10-16,25-35,40- column 3, col. 4 lines 1-10,22-32,50-57, col. 5 lines 1-50, col. 6 lines 10-67, columns 7-8, col. 9 lines 5-20, col. 10 lines 1-15.

As per claim 7, O'Conner [6,720,555] teaches an evacuable chamber, which receives the measurement cell, the evacuable chamber being arranged in use within the magnet bore. See O'Conner [6,720,555] abstract, figs. 1-7, col. 1 lines 30-55, col. 2 lines 10-16,25-35,40- column 3, col. 4 lines 1-10,22-32,50-57, col. 5 lines 1-50, col. 6 lines 10-67, columns 7-8, col. 9 lines 5-20, col. 10 lines 1-15.

As per claims 8-9, O'Conner [6,720,555] in view of Weller [5,389,784] teach all aspects of the claims except for explicitly stating the axial centre of the measurement cell being arranged away from the geometric centre of the electromagnet in the axial direction, and that the electromagnet has an asymmetric winding so that the magnetic centre in the direction of the longitudinal axis of the magnetic bore being different from the geometric centre in that direction. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the axial centre of the measurement cell being arranged away from the geometric centre of the electromagnet in the axial direction, and that the electromagnet has an asymmetric winding so that the

magnetic centre in the direction of the longitudinal axis of the magnetic bore being different from the geometric centre in that direction, since it has been held that rearranging parts of an invention involves only routine skill in the art.

As per claims 10, O'Conner [6,720,555] in view of Weller [5,389,784] teach all aspects of the claims except for explicitly stating the cell having a length of at least 70 mm in the direction of the longitudinal axis. It would have been obvious to one having ordinary skill in the art at the time the invention was made for the cell to have a length of at least 70 mm in the direction of the longitudinal axis, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art.

As per claims 11,13, O'Conner [6,720,555] teaches the measurement cell having a front face defining an opening through which the ions are received from the upstream direction, and wherein the measurement cell is cantilevered or supported from a location in that upstream direction. It also teaches the measurement cell having a rear face opposed to the front face, a plurality of electrodes to generate an electric field across the cell volume, and a detector means, the rear face including at least one external electrical contact adapted to engage with at least one of a corresponding power supply contact and/or detector signal processing means. See O'Conner [6,720,555] abstract, figs. 1-7, col. 1 lines 30-55, col. 2 lines 10-16,25-35,40- column 3, col. 4 lines 1-10,22-32,50-57, col. 5 lines 1-50, col. 6 lines 10-67, columns 7-8, col. 9 lines 5-20, col. 10 lines 1-15.

As per claims 12,14, O'Conner [6,720,555] in view of Weller [5,389,784] teach all aspects of the claims except for explicitly stating that the measurement cell being movable relative to the magnetic assembly. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the measurement cell be movable relative to the magnetic assembly, since it has been held that the provision of adjustability, where needed, involves only routine skill in the art. In addition, it would have been obvious to one of ordinary skill in the art to have the measurement cell be movable relative to the magnetic assembly in order to allow one to adjust cell so that it would be properly aligned therefore insuring that that majority of ions would analyzed.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Meek [4,686,365] in view of Horning [2004/0217272] and further in view of Weller [5,389,784]. As per claim 15, Meek [4,686,365] discloses a mass spectrometer and method of mass of mass spectrometry, comprising generating ions from an ion source, guiding the ions into an ion trapping device, ion optics means to guide the ions from the source into the ion trapping device, an FT-ICR mass spectrometer having a measurement cell located within a bore of a magnet, the cell being downstream of a front face of that magnet, the FT-ICR mass spectrometer further comprising detector means to detect ions injected into the measurement cells, ion guiding means arranged between the ion trapping device and the FT-ICR mass spectrometer to guide the ions ejected from the trap into the FT-ICR mass spectrometer for the generation of a mass spectrum therein. Meek [4,686,365] also teaches the a potential being applied to accelerate the ions from the source to a kinetic energy E and to decelerate the ions at a location only immediately

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adjacent the front of the measurement cell, and downstream of the front face of the magnet. Meek [4,686,365] abstract, figs. 1-7, col. 2 lines 15-25, columns 3-4, col. 5 lines 35-45, col. 6 lines 15-65, col. 7 lines 1-10, 24-65, col. 8 lines 1-69, col. 9 lines 4-10, 20-45, col. 11 lines 1-20, and col. 16 lines 65-69. With regards to the applicants' claim concerning there being a power supply for generating an electric field, it is the examiner's view that this is inherent. It is inherent to use a power supply to aid in generating an electric field. However, Meek [4,686,365] does not explicitly state the ion guiding means being arranged between the ion trapping device and the FT-ICR mass spectrometer to guide the ions ejected from the trap into the FT-ICR mass spectrometer for generation of a mass spectrum. Horning [2004/0217272] does teach ion guiding means (140) being arranged between the ion trapping device and the FT-ICR mass spectrometer to guide the ions ejected from the trap into the FT-ICR mass spectrometer for generation of a mass spectrum. See Horning [2004/0217272] paragraphs [0010, 0017, 0030, 0046, 0048]. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to have ion guiding means be arranged between the ion trapping device and the FT-ICR mass spectrometer to guide the ions ejected from the trap into the FT-ICR mass spectrometer for generation of a mass spectrum in order to insure that the ions reach the cell of the FT-ICR. In addition it was known that one way to improve mass resolution and accuracy in ion storage type devices is to control the ion population that is stored/trapped, and subsequently analyzed in the mass analyzer as taught in Horning [2004/0217272]. However, Meek [4,686,365] in view of Horning [2004/0217272] do not explicitly state the ratio of the

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sectional area of the magnet bore to the sectional area of the cell volume, each defined in a plane perpendicular to the longitudinal axis being less than 4.25. Weller [5,389,784] teaches that it was known to have the magnetic bore (vacuum chamber) diameter be about 10.2-12.7 cm and the cell diameter to be about 7.6 cm. See Weller [5,389,784] col. 2 lines 35-40, and col. 6 lines 9-20. Therefore the radius= diameter/2 of the magnetic bore would equal 5.1-6.35 cm, and the cell radius would equal 3.8 cm. The area of each would equal $\pi * (\text{radius})^2$. Therefore the ratio, $R = ((\text{radius of magnetic bore})/(\text{radius of cell}))^2$. Based upon Weller [5,389,784], $R = ((5.1\text{cm})/(3.8\text{cm}))^2 = 1.80$. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to have the ratio of the sectional area of the magnet bore to the sectional area of the cell volume, each defined in a plane perpendicular to the longitudinal axis being less than 4.25, since it was known in the art to have the radii of the magnetic bore and cell to be sufficiently small.

Claims 16-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meek [4,686,365] in view of Horning [2004/0217272]. As per claims 16,27, Meek [4,686,365] discloses a mass spectrometer and method of mass of mass spectrometry, comprising generating ions from an ion source, guiding the ions into an ion trapping device, ion optics means to guide the ions from the source into the ion trapping device, an FT-ICR mass spectrometer having a measurement cell located within a bore of a magnet, the cell being downstream of a front face of that magnet, the FT-ICR mass spectrometer further comprising detector means to detect ions injected into the measurement cells, ion guiding means arranged between the ion trapping device and

the FT-ICR mass spectrometer to guide the ions ejected from the trap into the FT-ICR mass spectrometer for the generation of a mass spectrum therein. Meek [4,686,365] also teaches the a potential being applied to accelerate the ions from the source to a kinetic energy E and to decelerate the ions at a location only immediately adjacent the front of the measurement cell, and downstream of the front face of the magnet. Meek [4,686,365] also teaches detecting the ions within the measurement cell. See Meek [4,686,365] abstract, figs. 1-7, col. 2 lines 15-25, columns 3-4, col. 5 lines 35-45, col. 6 lines 15-65, col. 7 lines 1-10, 24-65, col. 8 lines 1-69, col. 9 lines 4-10, 20-45, col. 11 lines 1-20, and col. 16 lines 65-69. With regards to the applicants' claim concerning there being a power supply for generating an electric field, it is the examiner's view that this is inherent. It is inherent to use a power supply to aid in generating an electric field. However, Meek [4,686,365] does not explicitly state the ion guiding means being arranged between the ion trapping device and the FT-ICR mass spectrometer to guide the ions ejected from the trap into the FT-ICR mass spectrometer for generation of a mass spectrum. Horning [2004/0217272] does teach ion guiding means (140) being arranged between the ion trapping device and the FT-ICR mass spectrometer to guide the ions ejected from the trap into the FT-ICR mass spectrometer for generation of a mass spectrum. See Horning [2004/0217272] paragraphs [0010, 0017, 0030, 0046, 0048]. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to have ion guiding means be arranged between the ion trapping device and the FT-ICR mass spectrometer to guide the ions ejected from the trap into the FT-ICR mass spectrometer for generation of a mass spectrum in order

to insure that the ions reach the cell of the FT-ICR. In addition it was known that one way to improve mass resolution and accuracy in ion storage type devices is to control the ion population that is stored/trapped, and subsequently analyzed in the mass analyzer as taught in Horning [2004/0217272].

As per claims 17,28, Meek [4,686,365] in view of Horning [2004/0217272] teach all aspects of the claim except for explicitly stating accelerating the ions to a kinetic energy of in excess of 20eV for substantially all of the path from the ion trapping device to the location immediately in front of the measurement cell. Meek [4,686,365] does teach accelerating the ions to the location immediately in front of the measurement cell. See Meek [4,686,365] col. 3 line 50 – col. 4 line 25. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to accelerating the ions to a kinetic energy of in excess of 20eV for substantially all of the path from the ion trapping device to the location immediately in front of the measurement cell, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art.

As per claim 18, Meek [4,686,365] in view of Horning [2004/0217272] teach all aspects of the claim except for explicitly stating accelerating the ions to a kinetic energy of in excess of 20eV for substantially all of the path from the ion source to the location immediately in front of the measurement cell. Meek [4,686,365] does teach accelerating the ions to the location immediately in front of the measurement cell. See Meek [4,686,365] col. 3 line 50 – col. 4 line 25. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to accelerating

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the ions to a kinetic energy of in excess of 20eV for substantially all of the path from the ion source to the location immediately in front of the measurement cell, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art.

As per claims 19,29, Meek [4,686,365] in view of Horning [2004/0217272] teach all aspects of the claim except for explicitly stating accelerating the ions to a kinetic energy of in excess of 50eV. It would have been obvious to one having ordinary skill in the art at the time the invention was made to accelerating the ions to a kinetic energy of in excess of 50eV, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art.

As per claims 20,30-31, Meek [4,686,365] in view of Horning [2004/0217272] teach all aspects of the claim except for explicitly stating accelerating the ions to a kinetic energy, E , for at least 90% of the distance from the ion trapping device to the measurement cell or for at least 90% of the distance from the ion source to the measurement cell. It would have been obvious to one having ordinary skill in the art at the time the invention was made to accelerate the ions to a kinetic energy, E , for at least 90% of the distance from the ion trapping device to the measurement cell or for at least 90% of the distance from the ion source to the measurement cell, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art.

As per claim 21, Meek [4,686,365] teaches the ion guiding means comprising at least one injection multipole ion guide. See Meek [4,686,365] figs. 2, 4a-4b, col. 2 line 65-col. 3 line 2, col. 4 lines 64-69.

As per claim 22, Meek [4,686,365] teaches the ion guide means comprising a plurality of injection multipole ion guide in series with one another. See Meek [4,686,365] figs. 2, 4a-4b, col. 2 line 65-col. 3 line 2, col. 4 lines 64-69. Also see Horning [2004/0217272] paragraphs [0046, 0048, 0066-0067, 0079, 0090].

As per claim 23, Meek [4,686,365] in view of Horning [2004/0217272] teach all aspects of the claim except for explicitly stating each injection multipole ion guide has a longitudinal axis, and wherein the alignment of the axis of each ion guide with a subsequent and/or preceding ion guide is less than about 0.1 mm. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have each injection multipole ion guide has a longitudinal axis, and wherein the alignment of the axis of each ion guide with a subsequent and/or preceding ion guide is less than about 0.1 mm, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art.

As per claim 24, Meek [4,686,365] in view of Horning [2004/0217272] teach all aspects of the claim except for explicitly stating the maximum radius of the inner volume of the ion guides being less than 4 mm. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the maximum radius of the inner volume of the ion guides be less than 4 mm, since it has been held that

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discovering an optimum value of a result effective variable involves only routine skill in the art.

As per claim 25, Meek [4,686,365] in view of Horning [2004/0217272] teach all aspects of the claim except for explicitly stating the maximum radius of the inner volume of the ion guides being less than 2.9 mm. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the maximum radius of the inner volume of the ion guides be less than 2.9 mm, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art.

As per claim 26, Meek [4,686,365] teaches the ion guiding means further comprising at least one lens for focusing the ions. See Meek [4,686,365] abstract, figs. 4a-4b. Also see Horning [2004/0217272] paragraphs [0046, 0048, 0066-0067, 0079, 0090].

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anthony Quash whose telephone number is (571)-272-2480. The examiner can normally be reached on Monday thru Friday 9 a.m. to 5 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R. Lee can be reached on (571)-272-2477. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A. Quash

A. Quash
10/14/05

Nikita Wells

NIKITA WELLS
PRIMARY EXAMINER

10/17/05